Biodiversity Conservation Strategy for the Greater Vancouver Region

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Abstract
In 1999, representatives from Environment Canada, the Province of B.C. and the Greater Vancouver Regional District formed a partnership to renew efforts to coordinate the management of habitat in the Greater Vancouver Region with the objective of conserving biodiversity. Increasingly, managing for biodiversity is recognized to provide multiple and synergistic environmental, economic and social benefits. It is an important characteristic of sustainability. The *Biodiversity Conservation Strategy for the Greater Vancouver Region* pilot project emerged through the Georgia Basin Ecosystem Initiative. Coordination with stewardship, municipal and academic initiatives is continuing to develop. It is anticipated that this project will have application to other regions within the Georgia Basin while advancing federal, provincial, regional and local biodiversity goals.

An overview of the project was presented at the Georgia Basin/Puget Sound Research Conference on April 1, 2003. Areas of current work highlighted included:

- A habitat assessment using GIS mapping, satellite imagery, and indicator species identifying reservoirs, corridors, sensitive areas and species.
- An analysis of existing policies, tools and practices affecting biodiversity conservation in the region.
- Case studies evaluating social, economic and environmental benefits (e.g. nature's services) and costs of conserving biodiversity.
- Priorities and directions towards the development of a framework and strategy for Biodiversity Conservation in the Greater Vancouver Region.

Introduction
Biodiversity is the variety of species and their inter-relationships at a range of scales from the individual (genetic diversity) to the ecosystem to the biosphere. Biodiversity instills resiliency in ecological systems and is an important characteristic of sustainability. Biodiversity conservation is an integrating objective providing multiple and synergistic environmental, economic and social benefits.

A Biodiversity Conservation Strategy for the Greater Vancouver Region is being developed as a partnership project under the Georgia Basin Ecosystem Initiative/Georgia Basin Action Plan. The managing partners in the project are: Environment Canada (through the Georgia Basin Ecosystem Initiative Coordinating Office and Canadian Wildlife Service), Province of British Columbia (Ministry of Water Land and Air Protection and Ministry of Sustainable Resource Management), Greater Vancouver Regional District (GVRD), and
Burrard Inlet Environmental Action Program - Fraser River Estuary Management Program.

A number of partners are also engaged in the project at a working level including: staff representing member municipalities in the GVRD, Simon Fraser University - Resource and Environmental Management, Douglas College - Institute of Urban Ecology, Langley Environmental Partners and Ducks Unlimited.

Initiated in 1999, the key objectives of the project are to:

- Evaluate the status of biodiversity in the region through an assessment of the network of ecologically significant areas and habitats;
- Identify and assess key issues associated with biodiversity conservation in the region;
- Assess the value of conserving biodiversity locally and regionally; and
- Develop a coordinated framework, strategies and actions to conserve biodiversity in the region.

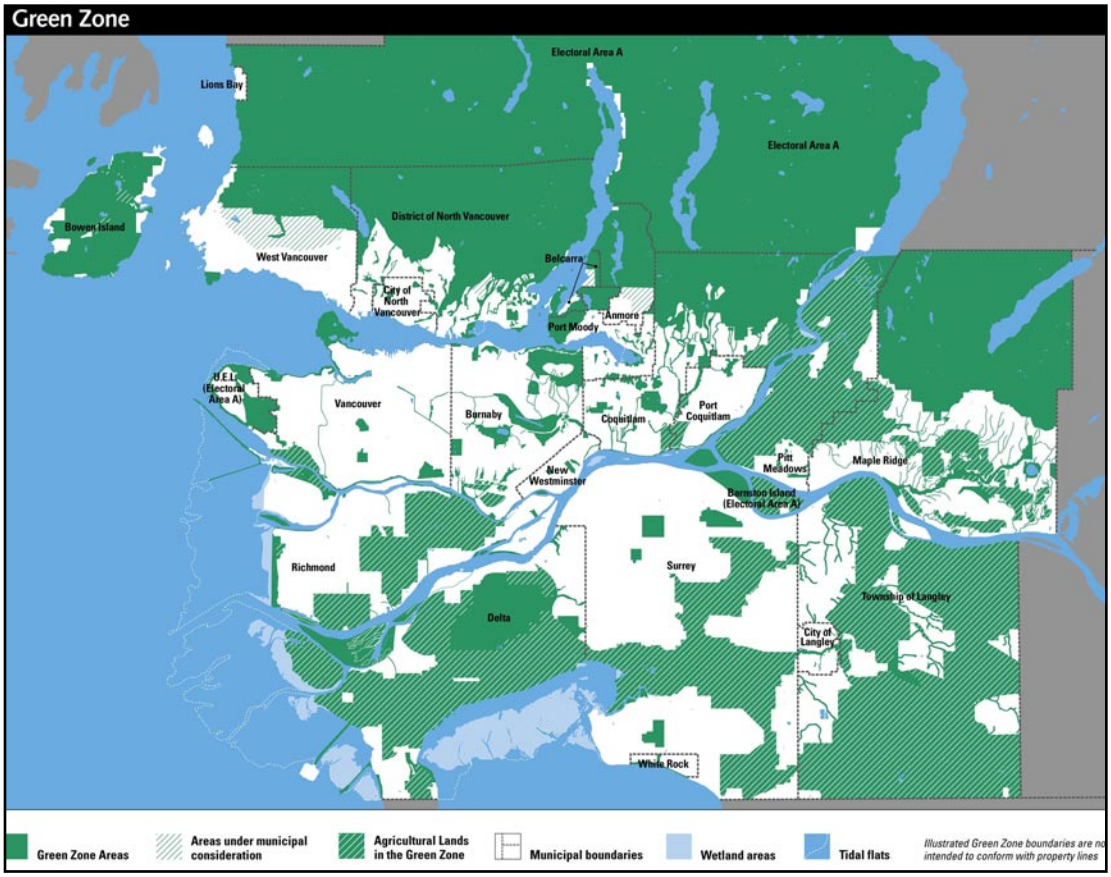

Figure 1. The Green Zone includes lands designated by member municipalities of the GVRD for no intensive development within the regional growth strategy, the Livable Region Strategic Plan. Lands have been designated for ecological (e.g. conservation areas), community health (e.g. drinking watersheds), renewable resource (e.g. agriculture) and recreational values (e.g. parks).

Context/Rationale

The Greater Vancouver Region contains diverse and productive ecosystems within urban and non-urbanized areas which are essential to the health and livability of the region. The Fraser River estuary and Burrard Inlet provide internationally significant habitat for salmon and migratory birds. The North Shore mountains and drinking watersheds are important ecological reservoirs for many sensitive species. The region's agricultural lands provide important ecological functions including food production and habitat. At the same time, our urban ecosystems comprising the network of streams, riparian areas, greenspaces and forests provide vital functions, habitat and connectivity to this larger network of lands. Collectively, these species and ecosystems regulate our climate, clean our freshwater and atmospheric gases, maintain the water cycle, treat wastes, generate soils, pollinate crops and recycle nutrients.

There is a well-established network of greenspaces in the GVRD, including the region's Green Zone which includes lands designated by municipalities within the regional growth strategy for no intensive urban development due to their ecological, community health, renewable resource or recreational functions. Despite this well-established network, our understanding of the status of biodiversity within these areas is limited and management of these areas is variable and may not sustain resilient ecosystems in the long term.

With growth in the region estimated to exceed 3 million people by 2020, the potential loss, fragmentation and disturbance of habitats associated with increased human activities can have detrimental effects on our quality of life. While protecting biodiversity in wilderness areas involves maintaining a range of ecosystems and native species, protecting biodiversity in highly urbanized regions is an even more complex task which involves consideration of human activities on the landscape and the fragmentation of habitats as well as the impacts of invasive and exotic species.

Figure 2. Green infrastructure includes natural ecosystems and engineered facilities that are important in maintaining ecological functions in urbanized areas.

Biodiversity conservation efforts in the region have traditionally focused on specific habitat (e.g. conservation areas) and species (e.g. salmonids). However, the significance of the region's "green infrastructure" is increasingly recognized towards maintaining ecological viability, conserving biodiversity and working towards sustainability. Green infrastructure represents the substructure or underlying foundation that provides critical ecological functions upon which the growth and health of the region depends. Green infrastructure includes natural ecosystems (e.g. streams, riparian areas, greenways) that provide ecological services (e.g. water conveyance, filtration, infiltration, connectivity, habitat) as well as engineered facilities (e.g. green roofs, stormwater retention and biofiltration ponds, farms, irrigation works, hedgerows, green buildings) that maintain ecological functioning in both urbanized and rural areas. Through the project, means to coordinate management strategies to conserve biodiversity for areas and for green infrastructure will be developed.

Project Components

The project is being prepared in four main phases:

Phase 1 - Background (Spring 1999 - year end 2001)

Phase 1 was undertaken from the Spring of 1999 until the end of 2001. During this phase, partners identified the need to coordinate management efforts to conserve biodiversity throughout the region and initiated the project. A number of background discussion papers were prepared which defined biodiversity and outlined federal and provincial directions towards biodiversity conservation as well as defining objectives for the strategy in the regional context. A stakeholder workshop was held in 2001 with participation from member municipalities, stewardship groups, First Nations representatives, developers and other stakeholders. A vision for biodiversity conservation in the region was drafted, key issues were identified, mapping data was shared and scoping of the project was determined.

Phase 2 - Habitat Assessment and Mapping (Spring 2001 - Spring 2004)

The Ministry of Water Land and Air Protection (MWLAP) and the Ministry of Sustainable Resource Management (MSRM) have been leading work to map and assess the status of biodiversity in the region. The assessment builds on existing mapping and data including municipal greenspaces and environmentally sensitive areas, regional Green Zone and federal and provincial wildlife management areas. Corridors and connections between habitats, including smaller habitats (e.g. backyards, street trees and urban forests) that may cumulatively provide significant ecological functions at the regional scale will be evaluated. Work includes:

- Preparation of a consolidated GIS map and data base of habitats in the region at a variety of scales.
- Completion of a gap analysis whereby mapped areas are evaluated based on management regime towards biodiversity conservation.
- A pilot assessment of habitat type using various remote sensing applications within an area of Langley Township, where habitat has been inventoried in detail, to test for broader regional application being developed in partnership with Simon Fraser University and Langley Environmental Partners Society.
- Development of a set of indicator species and habitat profiles for monitoring regional biodiversity through a partnership with Douglas College Institute of Urban Ecology.

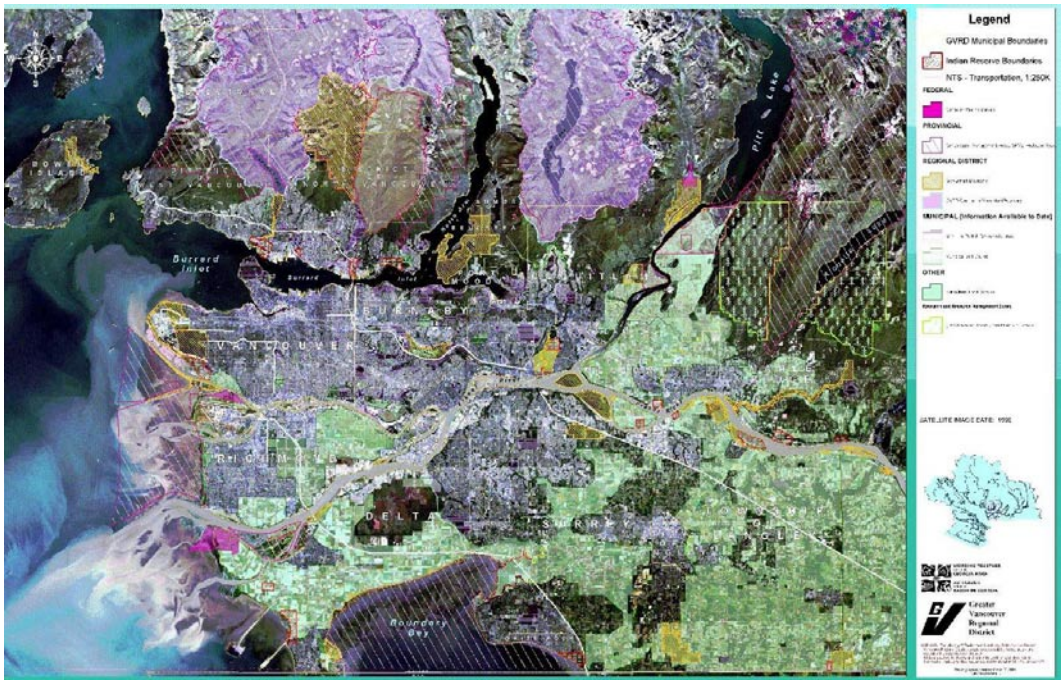

Figure 3. Draft base case mapping of publicly owned lands for assessment for biodiversity conservation. Prepared for a stakeholder workshop in April, 2001.

This component of the project is key as it provides the basis of understanding what the status of biodiversity is in the region. However, it is also the most challenging and resource intensive. A variety of tools and analyses are being tested to determine the most effective means to assess and map habitat. Currently, MSRM and MWLAP staff are examining the potential of using Landsat imagery to assess habitat coverage which would be the most cost effective means of gaining data at a regional scale. IKONOS is a more detailed satellite imagery coverage that would provide information useful at a municipal planning scale. However, the detailed satellite imagery is substantially more expensive.

Through WLAP and the Douglas College Institute of Urban Ecology initial work to select indicator species and prepare a model for monitoring habitat quality has been completed through the preparation of *"Conserving Biodiversity in Greater Vancouver: Indicator Species and Habitat Quality, 2002*." The Great Lakes Habitat Rehabilitation Program which includes a framework for guiding habitat rehabilitation in Great Lakes areas of concern, was used as a model to develop indicator species and habitat requirements for the Greater Vancouver region. Similar to the Great Lakes Basin Model, third order watersheds (1:5,000 – 1:20,000) were used as a scale for planning and monitoring.

The use of indicator species is seen as a more manageable option to determine the status of biodiversity without inventorying and monitoring every species within the region. Within the model, habitat quality and biodiversity are assumed to be directly associated and both assessed by using indicator species. The abundance of an indicator is an index of habitat quality and this may indicate habitat suitability for other species. For example, benthic invertebrates are used to determine water quality of streams. Spotted owls indicate health of old growth forests. Indicators were chosen to represent all habitat types found within the Greater Vancouver Region. Criteria for indicator species were selected and include species that are:

- Sensitive to environmental stress.
- Specialists.
- Permanent residents.
- Regional breeders.
- Similar habitat requirements to other species.
- Associated with heterogeneous habitats.
- Visible and identifiable.
- Relatively easy and cost effective to monitor.

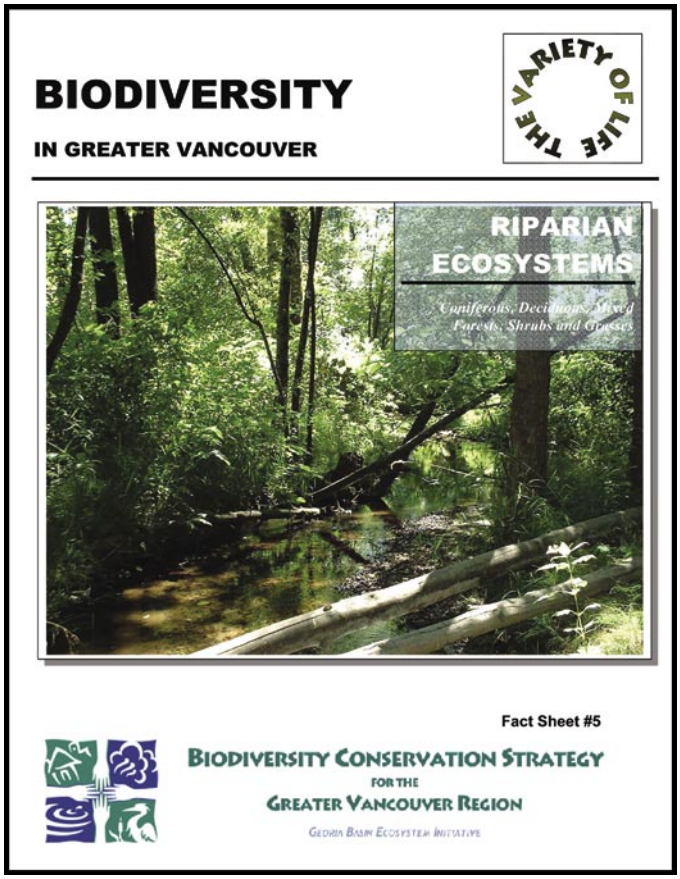

Figure 4. Riparian Ecosystem Fact Sheet from Conserving Biodiversity in Greater Vancouver: Indicator Species and Habitat Quality work completed by Douglas College Institute of Urban Ecology and BC Ministry of Water Land and Air Protection.

In total, 68 indicator species were selected including fish, birds, mammals, insects and plants in association with eleven ecosystem classes. Minimum habitat requirements for each ecosystem class were then defined within the framework. A series of Biodiversity Fact Sheets have been developed for each ecosystem class with a general description and map, an outline of status and threats and a relatively comprehensive wildlife and plant checklist for each. At least two indicator species are associated with each ecosystem class.

While indicator species and ecosystem fact sheets are an excellent tool for those involved in conservation and development planning and management, all assumptions must be validated through further research and fieldwork. Work to this end is currently being conducted through graduate research of Simon Fraser University – Resource and Environmental Management.

Phase 3 - Issues and Strategic Directions (Spring 2002 - Summer 2003)
In 2002, partners contributed toward the preparation of an *Issues and Strategic Directions* research contract. Work by the consultants (Axys Environmental Consultants) was completed in March 2003. The study included the following components:

- Examining the current institutional framework and issues involved in conserving biodiversity.
- Preparing an evaluation of economic, social and environmental benefits associated with conserving biodiversity in a number of regional case studies.
- Determining priorities and strategic directions to advance the development of a regional strategy to conserve biodiversity.

The first phase of the report provides a useful reference document and analysis of biodiversity conservation 'players' and their mandates, initiatives, tools, priorities and challenges. Interestingly, the study found a key challenge to be the multiplicity of initiatives that exist within the region. For instance, while there are over 40 federal and provincial

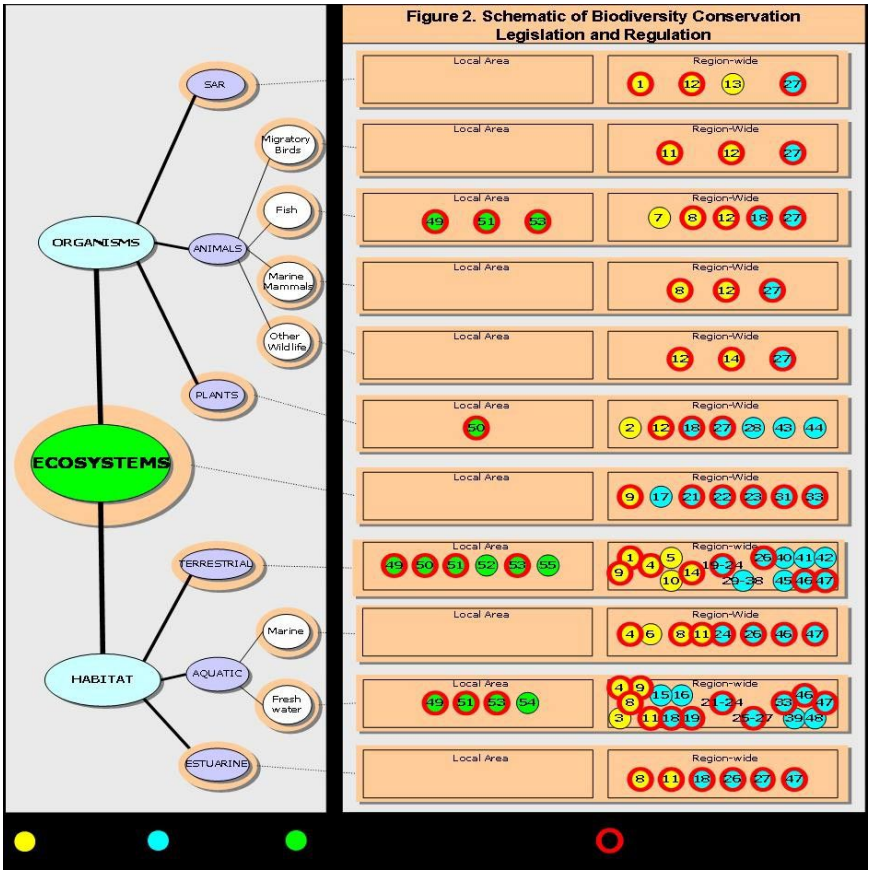

Figure 5. Figure from Axys Environmental Consultants Issues and Strategic Directions Research that illustrates the complexity of the legislative and regulatory framework related to biodiversity conservation. While numerous regulations to protect or manage specific components of ecosystems (e.g. fish habitat, migratory birds) exist, few address whole ecosystems or biodiversity conservation.

legislative acts that can be considered to have either a direct or indirect impact on the conservation of biodiversity, none address biodiversity conservation explicitly and few address ecosystems (as opposed to their components). Certain legislative tools may be in conflict with each other, or decision-makers may have too many tools rather than the "right tools." For example, project interviewees indicated that they are more limited in their ability to conserve terrestrial habitats (as opposed to aquatic). Yet, the study demonstrated that terrestrial ecosystem components are the subject of the largest number of legislative tools. Further, the strength of individual acts with respect to the protection of particular ecosystem components is variable. In reviewing regional and local policy and planning tools, the report notes that there appear to be fewer policies than management plans, programs or strategies pertaining to ecosystem components. This may indicate that certain plans, programs or strategies are being developed in the absence of over-arching policy direction.

In the evaluation of case studies, the benefits derived from biodiversity conservation were seen as significant from social, economic and environmental perspectives.

An example assessed in the study is an integrated stormwater management facility constructed for the Oaklands development in Deer Lake Park in Burnaby, BC. The constructed wetland/biofiltration pond system treats stormwater from a 50-acre parcel containing a 539 unit development. The City of Burnaby required that the development address the treatment of storm run-off to avoid impacting Deer Lake, an urban lake with chronic high nutrients, coliforms and temperatures. The constructed wetland system includes a large biofiltration pond, wetland channel and bypass channel for extreme storm events. Extensive marsh and riparian planting was installed and a boardwalk and viewing platform were integrated as part of the development of the pond. Overall, the evaluation revealed that the cost of the system (approximately $900,000 Cdn. in construction and maintenance) was comparable to a conventional system (storm drain and culverts). There was a significant increase in wetland habitat and recreational and aesthetic values within Deer Lake

Figure 6. Oaklands biofiltration pond in Deer Lake, Burnaby provides multiple environmental, social and economic benefits that work towards biodiversity conservation.

Park. Perhaps most significantly, the system is highly effective removing essentially all excess nutrients (e.g. Phosphorus, Nitrogen), hydrocarbons and heavy metals and other pollutants from in-coming waters into Deer Lake. Given the severity of water quality issues in Deer Lake and the potentially invasive and costly measures that could be considered if measures to manage in-coming sources of nutrients and contaminants are not undertaken, the study found that the Oaklands integrated stormwater management system provided multiple and significant benefits that ultimately worked towards biodiversity conservation.

While some level of economic benefit could be derived for each case study, overall the lack of specific data inhibited evaluations—particularly those relating to ecosystem services. Qualitative information was used to supplement case study assessments. Areas for further work include the need to identify regionally applicable incentives for biodiversity conservation activities (e.g. tax relief, eco-gifting, compensation programs, density bonusing, etc.). The approach of evaluating replacement costs should be considered in future assessments. The project partners are also interested in piloting the application of CITYgreen software that quantifies economic benefits of stormwater and air quality management services provided by urban tree coverage.

In total, twenty-two priorities were identified in this phase of work along with implementation frameworks, targets and a preliminary set of indicators for each priority. Strategic directions include recommendations for each of the following areas:

- Regional coordination.
- Addressing gaps, overlaps and conflicts in the administrative framework.
- Building on what's already in place.
- Monitoring success.

Phase 4 - Framework and Strategy (Summer 2003 - end of 2004)
Building on work completed in phase 2 and phase 3 of the project, a framework for biodiversity conservation in the region will be created. The framework will define biodiversity conservation within the context of the initiative along with principles, a vision and priorities for biodiversity conservation in the region. It will also outline potential roles of federal, provincial, regional and local governments as well as private land owners and stewards in conserving biodiversity and implementing the Biodiversity Conservation Strategy. The framework will include consolidated maps of areas for biodiversity conservation including core habitats and reservoirs, representative habitats and corridors to connect areas, coordinated management measures and a "biodiversity conservation toolkit" of best management practices, incentives and management tools and case studies highlighting application of integrated biodiversity conservation tools. Tools will be developed at a range of scales from the regional, to the watershed level to the community planning level. Overall, partners can use the framework to guide which actions are appropriate for them to adopt and implement. It is felt that such an approach enhances the potential for buy-in and participation by partners.

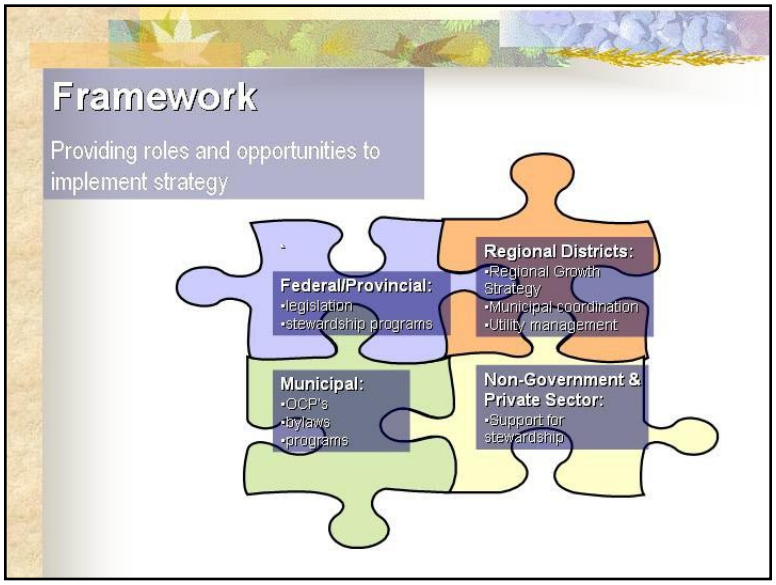

Figure 7. The framework for the Biodiversity Conservation Strategy for the Greater Vancouver Region will identify potential roles for various levels of government, the private and non-profit sector to implement the strategy.

Figure 8. A "Biodiversity Conservation Toolkit" will be developed as part of the strategy and include tools that work towards biodiversity conservation at different scales.

The Biodiversity Conservation Strategy will ultimately involve a consolidation and synthesis of all project components outlined in this paper as well as the development of:

- An implementation strategy/action program.
- A communications strategy for raising awareness and encouraging stewardship regarding biodiversity conservation.
- A monitoring program to track progress and the status of biodiversity in the region.

Completion of the Biodiversity Conservation Strategy for the Greater Vancouver Region is anticipated by approximately the end of 2004.

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website: http://wlapwww.gov.bc.ca/sry/fwh/GBEI/index.htm